**TAQ 1**

**2. Describe what is happening within a particle when radioactive emissions alpha, beta and gamma are produced. Explain at least one medical practical application of each of these forms of radiation.**

Ans.

When an atom emits an alpha particle during the process of alpha decay, the atom's mass number decreases by four because it loses four nucleons as an aplha particle. Alpha particles are energetic nucle of helium and are relatively heavy. They primarily interact with matter through coulomb forces.

**94238Pu --> 92234U + 24He (Alpha Particle)**

Plutonium-238, is used as an energy source to power pacemakers for heart.

Beta decay happens when an isotope has too many neutrons to be stable, it loses neutrons by beta decay to attain more stable configuration. Beta particle is a high energy, high speed electron. And it has high penetrating power.

**90234Th --> 91234Pa + −10e (Beta Particle)**

Because of high penetrating power and high energy it is used to prevent the clogging of arterial inserts.

Once an unstable particle has undergone alpha or beta decay, its nucleus may still be in an excited energy state. This extra energy is released in the form of a gamma photon. Gamma rays are high energy photons with no mass and charge.

**92238U --> 24He + 90234Th + 200γ (Gamma Photon)**

If used in high enough doses, it can be used to treat cancer in a process called radiation therapy.

Reference List

Nuceng.ca. (2017). Radioactivity. [online] Available at: http://www.nuceng.ca/igna/radioactivity.htm [Accessed 8 Aug. 2017].

Mirion. (2017). Types of Radiation: Gamma, Alpha, Neutron, Beta & X-Ray Radiation Basics. [online] Available at: https://www.mirion.com/introduction-to-radiation-safety/types-of-ionizing-radiation/ [Accessed 8 Aug. 2017].

Cyberphysics.co.uk. (2017). Beta Particle Emission. [online] Available at: http://www.cyberphysics.co.uk/topics/radioact/Radio/beta.html [Accessed 8 Aug. 2017].

**5. Describe and explain each step in the process of taking an X-Ray photograph; include all the details from when the patient arrives in the radiography department up to when an image is formed.**

Ans.

Most x-rays require no special preparation from the patients side. When in the x-ray lab the procedure is explained to the patient and then he/she wears a hospital gown and all items like watches, necklaces and metal objects are removed. Also, the patient is asked if any metallic implants are present in his/her body.

Some x-ray photographs require the patient to drink a contrast medium to help outlining a specific part of the body. The patient may be asked to:

* 1. Receive an injection of contrast medium
  2. Drink a solution of iodine or barium
  3. Swallow a pill

The radiologist will place the patients body between the x-ray camera and the x-ray film. Desired part of the body is exposed to the x-ray radiation and the film then creates a digital image.

Reference List

Anon, (2017). [online] Available at: https://www.insideradiology.com.au/plain-radiographyx-rays/ [Accessed 8 Aug. 2017].

Chop.edu. (2017). General Radiography: X-ray | Children's Hospital of Philadelphia. [online] Available at: http://www.chop.edu/treatments/general-radiography-x-ray [Accessed 8 Aug. 2017].

**6. Describe the principle of CT scanning. Explain how coronal, sagittal and transverse images are produced.**

Ans.

CT scan is the abbreviated term for “Computed Tomography” scanning. It is based on the principle of X-Ray imaging, i.e. when x-rays are passed through the body, they get weakened at different levels. When they fall onto an x-ray film, it generates an x-ray image.

In a CT scan, both the x-ray source or camera and the x-ray film can rotate around the patients body. Thus it is possible to take many number of images from different angles and then this information is processed by a computer to generate a 3-D profile of the patients x-rayed body part or of the wgole body if necessary.

In radiology, the standard imaging plane is the axial plane (transverse plane). From the data set collected for transverse image, the coronal and sagittal images can be generated by using multiplanar reformats. This allows the same information to be viewed from differenr viewing angles.

* Axial Plane (transverse plane) : These images represent slices of the body.
* Sagittal Plane : These images are taken perpendicular to the axial plane. In these images the axial plane separates the left side from the right side of the body.
* Coronal Plane : These images are taken from an axis perpendicular to the sagittal plane. The coronal plane separates the front and back of the body.

Reference List

[Imaginis.com. (2017). How Does CT Work? | CT Scan | Imaginis - The Women's Health & Wellness Resource Network. [online] Available at: http://www.imaginis.com/ct-scan/how-does-ct-work [Accessed 8 Aug. 2017].](http://www.imaginis.com/ct-scan/how-does-ct-work)

Ozradonc.wikidot.com. (2017). 7.2 - Principles Of CT Scanning - OzRadOnc. [online] Available at: http://ozradonc.wikidot.com/principles-of-ct-scanning [Accessed 8 Aug. 2017].